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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/720,275	02/22/2001	Gunter Fuhr	A33828 PCT U	9406

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EXAMINER

MUTSCHLER, BRIAN L

ART UNIT PAPER NUMBER

1753

DATE MAILED: 08/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/720,275

Applicant(s)

FUHR ET AL.

Examiner

Brian L. Mutschler

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-32 and 36-38 is/are rejected.
- 7) ☒ Claim(s) 33-35 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Comments

1. The objection to the specification has been overcome by Applicant's amendment.
2. The rejection of claims 22-25 and 29-38 under 35 U.S.C. 112, second paragraph, has been overcome by Applicant's amendment.
3. The rejection of claims 20, 21, 29, and 38 under 35 U.S.C. 102(b) over Pohl (U.S. Pat. No. 4,326,934) has been overcome by Applicant's amendment. Pohl teaches that the electrodes are straight and parallel to one another.
4. The rejection of claims 20, 30, 31, 33, and 38 under 35 U.S.C. 102(b) over Crane (U.S. Pat. No. 5,489,506) has been overcome by Applicant's amendment. While Crane teaches the use of a plurality of straight electrode segments, the segments are all arranged at the same angle, not different angles as recited in the amended claims.
5. The rejection of claims 20, 29, 34, and 38 under 35 U.S.C. 102(e) over Becker et al. (U.S. Pat. No. 5,888,370) has been overcome by Applicant's amendment. Becker, et al. teach that the electrode array may be installed at any angle, but the electrodes are not arranged at different angles. Each electrode is arranged at the same angle.

Drawings

6. The drawings are objected to under 37 CFR 1.83(a). Applicant deleted figure 11 in the amendment filed March 5, 2004. This figure was the only drawing that depicted the cuboid collecting electrode recited in claims 36 and 37. The drawings must show

every feature of the invention specified in the claims. Therefore, the cuboid electrodes must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

8. Claims 25, 31, 34, 36, and 38 are objected to because of the following informalities:

- a. In claim 25 at line 2, please change "comprise two microelectrodes are being provided" to either --comprise two microelectrodes that are being provided-- or --comprise two microelectrodes provided--.
 - b. In claim 31 at line 3, please change "then" to --than--.
 - c. In claim 34, it appears that the phrase "comprises three microelectrodes two of which being provided microelectrodes as focusing electrodes" should be changed to --comprises three microelectrodes, two of which being provided as focusing electrodes--.
 - d. In claim 36 at line 4, please delete "which" before "acting".
 - e. In claim 38, the phrase "microscopic particles." appears to be missing from the end of the claim after "deflecting, sorting, collecting and/or forming".
- Appropriate correction is required.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 20-31 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Fiedler et al. ("Dielectrophoretic Sorting of Particles and Cells in a Microsystem," Anal. Chem., 70, pp. 1909-1915 (1998)).

Regarding claim 20, Fiedler et al. teach a dielectrophoretic system comprising an electrode array housed in a channel, wherein the electrodes are positioned on a wall of the channel (fig. 2; page 1911). The field barrier generated by the electrodes would have a predetermined curvature relative to the direction of flow.

Regarding claim 21, the system comprises at least two electrodes of the same shape and alignment affixed on opposite walls (fig. 2A). The aligner electrodes and electrodes comprising the switch are in the shape of curved bands (fig. 2A).

Regarding claim 22, the switch electrodes have a resulting force that would point upstream at every position of the field barrier (fig. 2A). (The terms upstream and downstream do not have any structural weight in the claim. Additionally, the resulting force is a process limitation that does not further limit the structure of the electrodes insofar as the electrodes are configured such that they are capable of performing the specified function.)

Regarding claim 23, four electrodes are arranged to form a particle funnel (fig. 2A; p. 1912).

Regarding claim 24, the aligner electrodes are arranged such that the resulting force would act on a particle in one direction at one end of the electrode and the opposite direction at the other end of the electrode (fig. 2A).

Regarding claim 25, the switch electrodes are sorting electrodes that can sort particles based on their characteristics (fig. 2A; p. 1915).

Regarding claim 26, the switch electrodes comprise two V-shaped electrodes, which are closed in the downstream direction (fig. 2A).

Regarding claim 27, the system comprises electrodes acting in combination as collector electrodes (fig. 5).

Regarding claim 28, the collector electrodes are arranged in cross direction of the channel (fig. 5).

Regarding claim 29, the electrodes are arranged in pairs on the top and bottom surfaces of the channel (fig. 5A, page 1911).

Regarding claim 30, the system includes electrodes on opposite channel walls having different geometric shapes (fig. 2A).

Regarding claim 31, the system has a rectangular cross-sectional shape and the electrodes are band-shaped and disposed on opposite surfaces (fig. 2A; p. 1911). (All band-shaped electrodes are also area-shaped; it is impossible for an electrode not to have an area.)

Regarding claim 38, the system of Fiedler et al. is used to separate particles (p. 1909).

Since Fiedler et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

11. Claims 20 and 36-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Pethig et al. (U.S. Pat. No. 5,814,200).

Regarding claim 20, Pethig et al. disclose a dielectrophoretic system comprising at least one electrode (**41, 42, 43**) formed on a wall of a channel (figs. 11 and 13a). The electrodes would create a field barrier having a predetermined curvature with respect to the flow of fluid.

Regarding claims 36 and 37, the electrodes of Pethig et al. comprise a plurality of cuboid electrodes, which collect particles in the reservoir spaces between adjacent projections (figs. 13a-d, 14a, 14b, 19 and 20). As seen in the figures, the opposite electrode acts as a deflecting electrode (col. 15, line 20 to col. 16, line 19).

Regarding claim 38, the system is used to separate particles (col. 1, lines 60-62).

Since Pethig et al. teach all of the limitations recited in the instant claims, the reference is deemed to be anticipatory.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fiedler et al. ("Dielectrophoretic Sorting of Particles and Cells in a Microsystem," Anal. Chem., 70, pp. 1909-1915 (1998)).

Fiedler et al. disclose a system having the limitations recited in claims 20-31 and 38 of the instant invention, as explained above in section 10.

The system of Fiedler et al. differs from the instant invention because Fiedler et al. do not teach arranging the area-shaped electrode to be floating, as recited in claim 32.

Whether an electrode is floating, grounded, or polarized with a potential is determined by the desired operating conditions of the system. By grounding, floating or polarizing the electrodes, the driving force across the channel can be set to the desired operating conditions. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrode of Fiedler et al. to arrange it so as to be floating because setting the potential of the electrode allows the driving force across the channel to be controlled to achieve the optimum conditions.

Allowable Subject Matter

14. Claims 33-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 33-35 are distinguished over the prior art of record by providing a combination of elements neither taught nor suggested by the prior art of record. Claims 33 and 35 claim a microsystem having *inter alia* a separation wall with an aperture and a band-shaped electrode with a predetermined curvature or an electrode comprising a multitude of straight sections arranged at different angles. In claim 34, three

microelectrodes are provided, with two of the electrodes functioning as focusing electrodes, and the third electrode arranged as a field-forming auxiliary electrode spaced apart from the bottom and cover walls in the middle of the channel. Neither Fiedler et al. nor Pethig et al. teach or suggest the combination of elements recited in the instant claims. While Crane (U.S. Pat. No. 5,489,506) teaches the use of a separation wall, one of ordinary skill in the art would not have been motivated to add the separation wall to the devices of Fiedler et al. or Pethig et al. because the addition of a separation wall would unpredictably alter the performance of the devices. Likewise, one of ordinary skill in the art would not have added a third electrode in the middle of the channel as taught by Becker et al. (U.S. Pat. No. 5,888,370) to the device of Fiedler et al. or Pethig et al. because adding a third electrode would change the function of the devices.

Response to Arguments

15. Applicant's arguments filed March 5, 2004, have been fully considered but they are not persuasive.
16. Regarding the rejection of claims 20-31 and 38 over Fiedler et al., Applicant argues, "Curved band-shaped electrodes or electrodes comprising sections with different angles are not shown or described by Fiedler et al. (see page 12 of Applicant's response). This argument is not persuasive because the alignment and switch electrodes are comprised of straight segments arranged at different angles (see portion of Figure 2A reproduced below).

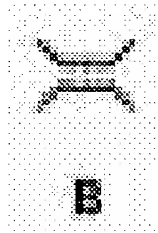


Figure 2A: Portion depicting alignment electrode.

As seen in Figure 2A, each electrode of the of the aligner consists of three straight segments arranged at three different angles.

17. Regarding the rejection of claims 20 and 36-38 over Pethig et al., Applicant argues, "Pethig discloses straight electrodes only" (see page 12 of Applicant's response). This argument is not persuasive because the claims are open to straight electrodes as long as they include a plurality of segments arranged at different angles. As seen in Figure 13a of Pethig et al., the electrodes comprise a plurality of straight segments arranged at different angles, i.e., 0°, 90°, 180°, and 270°.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within


TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BLM
July 28, 2004


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